

Slide 1 Accidents



Accidents

Slide 1 of 9 Module 3

[Menu](#) [Glossary](#) [Resources](#)

Laser Accidents


After completing this module, you should be able to:

- Identify the most common scenarios of research accidents
- Recognize why laser accidents happen
- Recognize how to avoid making mistakes that might lead to an injury
- Recall what to do if you are injured by a laser



As we saw with Ed in the introduction, injuries can happen when people make mistakes. And they can happen to anyone! After completing this module, you should be able to: Identify the most common scenarios of research accidents. Recognize why laser accidents happen. Recognize how to avoid making mistakes that might lead to an injury, and recall what to do if you are injured by a laser.

Slide 2 Accidents



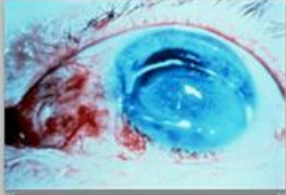
Accidents

Slide 2 of 9 Module 3

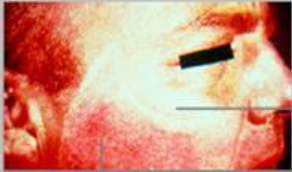
[Menu](#) [Glossary](#) [Resources](#)

Lasers in Research

Are laser accidents happening in research settings?



Laser eye injury




protected by laser eyewear

laser skin burn

Are laser accidents happening in research settings? The simple answer is yes. Eye injuries, skin burns, and even death have occurred in research facilities. Actually, the highest percentage of accidents happen in research and medical settings. And again, you'd be surprised how most of them happen and how easily they can be prevented.

Slide 3 Accidents (part1)

Laser Worker Training



Accidents

Slide 3 of 9 Module: 3

[Menu](#) [Glossary](#) [Resources](#)

True or False: Most laser accidents occur because of the complexity of scientific experiments? Select an answer.


☐ True

☐ False

True or False? Most laser accidents occur because of the complexity of scientific experiments.

If you selected “True,” actually that’s not the case. If you selected “False,” that’s right.

Slide 3 Accidents (part 2)



Accidents

Slide 3 of 9 Module 3

[Menu](#) [Glossary](#) [Resources](#)

Common Accident Scenarios

- Alignment while not wearing proper eye protection
- Stray beams
- Poor communication
- Wearing the wrong eyewear
- Inadequate on-the-job training
- Inadequate controls for non-beam hazards
- Equipment malfunction




Tinted safety glasses

Laser accidents are hardly ever a direct result of working on “high tech” experiments.

The most common accident scenarios involve: performing alignment while not wearing proper eye protection, stray beams reflected off optics; jewelry, badges, or other objects inserted or falling into the beam path; poor communication between users, wearing the wrong eyewear for wavelengths being used; inadequate or no on-the-job training, resulting in lack of familiarity with laser equipment; inadequate controls for non-beam hazards, and equipment malfunction.

Slide 4 Accidents

Laser Worker Training test



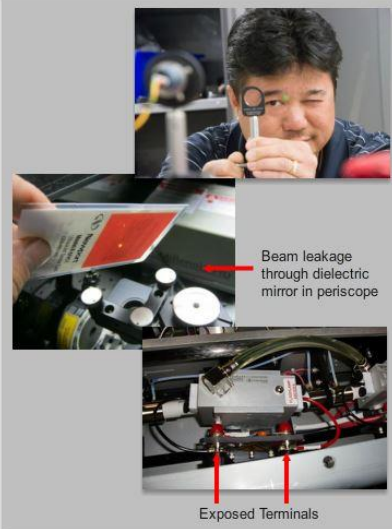
Accidents

Slide 4 of 9 Module: 3

[Menu](#) [Glossary](#) [Resources](#)

When do Laser Accidents Happen?

- Beam manipulation with incorrect eyewear
- Misaligned optics and upward directed beams
- Failure to contain beams and block stray beams
- Beam containment improperly restored after service
- High voltage or stored energy is overlooked
- Inadequate work planning
- Human factors



So, if most laser accidents aren't directly related to the complexity of experiments, how do they happen? Often, it's distractions or incorrect focus. Laser accidents are most common when: Performing beam manipulation with incorrect or no protective eyewear. There are misaligned optics and upward directed beams. There is a failure to contain beams and block stray beams. Laser beam containment is improperly restored after service or maintenance. High voltage or stored energy is overlooked. There is inadequate work planning, and when human factors come into play such as rushing the job, boredom, fatigue, illness, personal problems, lack of communication, and complacency.


Slide 5 Accidents



Accidents	
Slide 5 of 9	Module 3
Menu	Glossary Resources
VARIABLE	COMMON STATISTICS
Activity	Alignment/optic manipulation
Laser Eyewear	Incorrect or no eyewear
Laser Wavelength	780-1064 nm
Laser User Experience	All levels

As you can see by this chart, laser accidents often have similar characteristics. The involved individual: is usually aligning or manipulating optics, is usually NOT wearing laser eye protection, or the eyewear is incorrect for the wavelengths being used, is often using a 780 to 1064 nanometer beam, and may have any level of experience. An accident can happen to anyone!

Slide 6 Accidents






Accidents

Slide 6 of 9Module 3

[Menu](#)[Glossary](#)[Resources](#)


Be Safe by Following Lab Procedures

- Conduct work planning and hazard assessment
- Ensure good beam containment
- Wear protective eyewear
- See *Administrative/Procedural Controls* module for laser alignment practices
- Be alert to non-beam hazards and unexpected conditions
- Keep your training up-to-date



So, what can you do to prevent a laser accident? Be safe by following lab procedures and guidelines. Conduct careful work planning and hazard assessment. Ensure good beam containment. Wear your protective eyewear. Follow laser alignment practices described in Module 6 on Administrative and Procedural Controls. Be alert to non-beam hazards and unexpected conditions, and keep your safety training and operation-specific training current. However, if an incident does happen, will you be blind?

Slide 7 Accidents



The slide features a blue header with the University of Kentucky logo on the left, the title "Accidents" in the center, and "Slide 7 of 9" and "Module 3" on the right. Below the header, the text "Will I be Blind?" is displayed. A central graphic shows a clipboard with a white sheet of paper containing patient information and accident details. The patient is John Doe, with a date/time of May 9, 5:30 PM, and a heart rate of 70. The accident is a laser eye accident with a pulse width of 50fs, pulse energy of 2 mJ, and a wavelength of 800 nm. Possible ill effects listed are impaired vision and permanent injury. Navigation links for "Menu", "Glossary", and "Resources" are located in the top right corner of the slide content area.

Accidents

Slide 7 of 9 Module 3

[Menu](#) [Glossary](#) [Resources](#)

Will I be Blind?

Patient: **John Doe**
Date/Time: May 9, 5:30 PM
Heart Rate: 70

Laser Eye Accident:


- Pulse width: 50fs
- Pulse energy: 2 mJ
- Wavelength: 800 nm

Possible Ill Effects:

- Impaired Vision
- Permanent Injury

An unintentional laser eye injury is just that, unintentional. The extent of injury depends on the laser beam characteristics.. Some laser eye injuries have been major scares to users, but caused no permanent injury. Others have impaired a person's field of view and visual clarity. And some have resulted in permanent loss of vision in the eye.

Slide 8 Accidents




Accidents

Slide 8 of 9 Module 3

[Menu](#) [Glossary](#) [Resources](#)

If you are injured or suspect injury:

- Stay calm
- Follow site Incident Response Procedures
- Always get immediate medical assistance
- For a medical emergency, call 911 or your site's emergency response line
- Disable laser hazards
- Notify supervisors and Laser Safety Officer
- Secure the laser facility and preserve setup for any investigation



NEVER SELF-DIAGNOSE!

If you have been injured or suspect you may have been injured by a laser beam, first and foremost stay calm.


Follow your site's incident response procedures, and always get immediate medical assistance. If there is a medical emergency, call 911 or your site's emergency response line.

Laser hazards need to be disabled immediately. Supervisors and the LSO need to be notified, and the setup needs to be secured for subsequent investigation.

You never want to self-diagnose a possible laser injury. Time and time again, victims wait days to see if the effects go away rather than reporting them. This is not something to decide by yourself. Some laser eye injuries have a noticeable effect right away, while others may take longer to manifest. And some immediate treatment may be possible to limit the extent of the injury.

Slide 9 Accidents

Laser Worker Training




Accidents

Slide 9 of 9 Module: 3

[Menu](#) [Glossary](#) [Resources](#)

Other Accidents



Let's take a look at some other laser accidents. A worker was exposed to diffuse-scattered laser light due to a gap between the eyewear frame and the bridge of the worker's nose. The eyewear used was not a good fit for this worker. A scientist inserting a target in the beam path received a hand injury because he didn't know the beam was on. A student removed their laser eyewear while aligning a polarizer, and received an eye injury from an unexpected reflected beam. A researcher lowers his safety glasses to facilitate beam alignment. What is similar in all these incidents? They ALL HAPPENED WITHIN THE DOE COMPLEX! Learn from others' mistakes!

Take responsibility, and work safely.